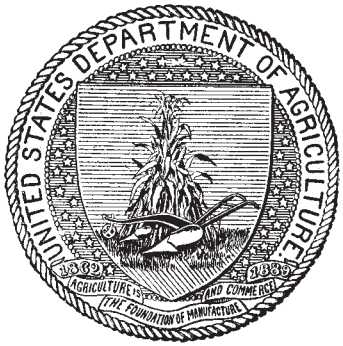
U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF LEON COUNTY, FLORIDA.

BY

HENRY J. WILDER, J. A. DRAKE, GROVE B. JONES, AND W. J. GEIB.

[Advance Sheets—Field Operations of the Bureau of Soils, 1905.]



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1906.

[PUBLIC RESOLUTION—NO. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the Congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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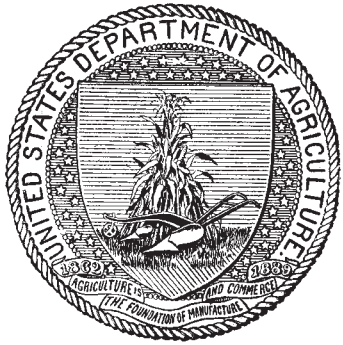

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., April 18, 1906.

SIR: In the early part of 1904 a petition was transmitted to this Bureau by the Hon. W. B. Lamar. This petition was signed by 95 citizens and land owners of Leon County, Fla., and in it they state that—

We, the undersigned citizens of Leon County, Fla., do respectfully petition that you use your efforts in securing through the Agricultural Department of the United States a soil survey of Leon County.

This petition was forwarded to Hon. W. B. Lamar by Dr. S. R. Radford, one of the signers and a land owner in the county, who says:

I have the honor, on behalf of the citizens of Leon County, Fla., to present to you the inclosed petition, asking you as our Representative in Washington to call to the notice of the Hon. James Wilson, Secretary of Agriculture, and Prof. Milton Whitney, Chief of the Bureau of Soils, the necessity for a soil survey of our county at an early date. As you are aware, the agricultural industries of our county are still in their infancy, especially the growing of tobacco. This industry is a large source of income to our neighbors in Gadsden County and last year the National Government, through the Bureau of Soils, helped and stimulated this and other industries in that county by making a soil survey and mapping out for the benefit of the farmers of that county their different types of soil. I, as a land owner in Leon County, along with the signers of the inclosed petition, ask for you to intercede on our behalf with the above-mentioned gentlemen and secure for us, your fellow-citizens in Leon County, this much-needed help.

Both the petition and Doctor Radford's letter were submitted to this Bureau by the Hon. W. B. Lamar, who took occasion to say, in indorsing the request:

The lands in Leon County are mostly of a very fine agricultural character. The tobacco industry in the adjoining county to the west, Gadsden County, is one of great extent and highly profitable. For quite a time it has been thought that the lands of Leon County were not so well adapted to tobacco growing as the lands of Gadsden County. Some successful tobacco growing is now done in Leon County, Fla., and with a view to finding out the adaptability of the lands of Leon County for tobacco culture and all other kinds of culture in the way of plants, grass, and other agricultural products, the citizens of Leon County have largely signed this petition to have the soils of Leon County surveyed.

The soil survey has been completed, and I have the honor to transmit herewith the map and the report to be published as advance sheets of the Report on Field Operations for 1905, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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SOIL SURVEY OF LEON COUNTY, FLORIDA.

By HENRY J. WILDER, J. A. DRAKE, GROVE B. JONES, and W. J. GEIB.

LOCATION AND BOUNDARIES OF THE AREA.

Leon County, situated in the north-central part of Florida, is bounded on the north by Gadsden County and the State of Georgia, on the east by Jefferson, on the south by Wakulla, and on the west by Liberty and Gadsden Counties. From the latter two counties it is separated by the Ocklocknee River, a winding, erratic stream flowing from northeast to southwest. The shape of the county is irregular, as is evidenced by its diagonals, which are about 48 miles from north-

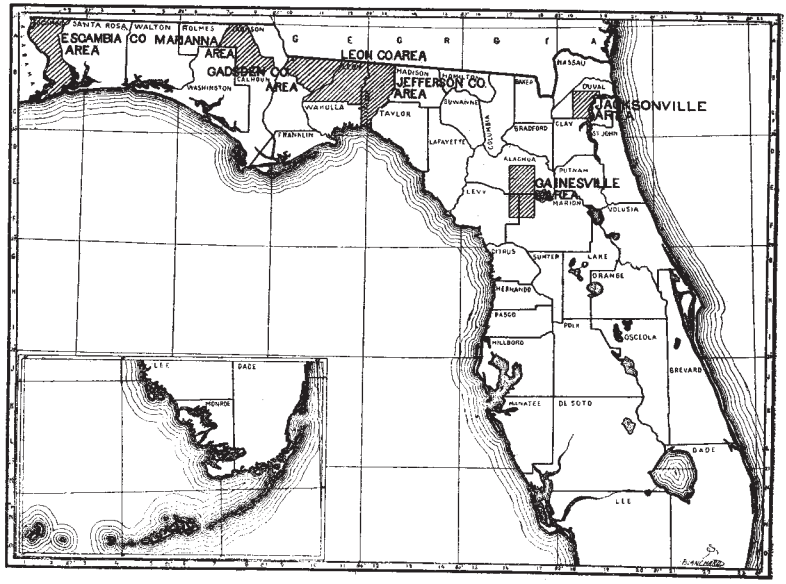

FIG. 1.—Sketch map showing location of the Leon County area, Florida.

east to southwest and 30 miles from northwest to southeast. The county has an area of 431,872 acres, or about 675 square miles, and in 1900 its total population was 19,887, of which number 3,886 were whites and 16,001 were negroes. The only town of importance in the county is Tallahassee, which in 1900 had a total population of 2,981.

The base map of the county, showing the location of the roads, towns, country post offices, railroads, and streams, was constructed

with the plane table by the field party as the soil mapping progressed. The county was originally plotted into sections, and many of the section lines are so definitely located at the present time by lines of trees, hedgerows, etc., that the base map has generally been made to conform to these long-recognized land lines, although few of the sections contain exactly 1 square mile.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The earliest settlements in Leon County were made by the Spanish, but the exact dates are not known. De Soto, after landing at the present site of Tampa in 1539, marched northward and spent the winter at Fort San Luis Hill, 2 miles west of Tallahassee. For two centuries Spain held possession of the region, but in 1763 Florida was ceded to the English. After the Revolutionary War Spain again obtained control of the territory, but in 1821 Florida was ceded to the United States. In 1823 Gadsden County was established, and in 1824 Leon was cut off from Gadsden, with the Ocklocknee River as the dividing line.

In 1823 the old Indian field of Tallahassee was selected as the site for the State capital, and two years later the cornerstone of the capitol was laid. Leon County was at that time an almost unbroken forest, but by 1830 its population, which had come mostly from Virginia, the Carolinas, and Georgia, was 6,494.

With the steady increase of population the development of agriculture was rapid. The land was divided into large plantations, which were worked with slave labor. Cotton was the principal crop, but beef was also an important product. Tilled fields were fenced and the remainder of the land—by far the greater part—was used as open range. In the winter seasons the fences were thrown down and the cattle allowed to roam over the entire country. The cattle were never housed, were fed neither grain nor hay, and at the age of 5 or 6 years—the usual time of slaughtering—dressed from 400 to 450 pounds. The uplands were then covered with open pine forests, while the hammock lands along the lakes and streams supported a growth of oak, hickory, beech, magnolia, bay, and a dense undergrowth. Where cleared these hammocks grew excellent crops of cotton, corn, peas, pumpkins, sweet potatoes, and sugar cane, without fertilizing. Until about fifteen years before the war every farmer raised sufficient corn, meat, and other supplies for his own needs, and bought little except mules, which were obtained from Kentucky and Tennessee. Improved herds of hogs and cattle were brought in from Georgia, the Carolinas, Kentucky, and Tennessee by settlers from these States, and many others were bought from drovers for the purpose of improving the native stock.

The early trading points were St. Marks, the nearest Gulf port, and Newport, a short distance farther north on the St. Marks River. There cotton was hauled by mule teams, which brought back dry goods, farming implements, machinery, and a few groceries, which had been brought by boat from New York and New Orleans.

About 1845 methods of farm management on the big plantations underwent a gradual change. Cotton, which had been the chief money crop, became almost the sole crop, thus necessitating the purchase of corn and meat, which hitherto had been grown at home. The disadvantages under this system of farm management soon became apparent, for the few large planters who retained the old system of growing their own supplies, and all the small planters, since they followed the same practice, became far more prosperous, even before the outbreak of the war, than those who devoted all their energies to the production of cotton. After the war the price of cotton decreased rapidly, while the cost of supplies steadily advanced, and severe depression followed. Those, however, who adhered to the early system of growing their own supplies and producing cotton only as the principal money crop were the earliest to regain prosperity, and this fact led to the slow and somewhat erratic, yet on the whole secure, extension of the system.

CLIMATE.

The following table shows the meterological records kept by the Weather Bureau station at Tallahassee, which is located near the center of the county, where the climatological influences are representative for the northern two-thirds of the county. Although the southern part of the area would probably show some variation from these observations, no records for that part of the county were obtainable:

Normal monthly and annual temperature and precipitation.

Month.	Tallahassee.		Month.	Tallahassee.	
	Temperature.	Precipitation.		Temperature.	Precipitation.
	° *F.*	*Inches.*		° *F.*	*Inches.*
January	51.5	3.51	August	79.1	7.44
February	54.6	5.73	September	76.7	4.64
March	59.2	5.59	October	67.8	3.42
April	66.9	1.99	November	58.9	2.58
May	74.5	3.48	December	52.8	4.10
June	78.8	6.36			
July	80.4	8.23	Year	66.8	57.07

The climate of the county is equable, the mean range between winter and summer being only about 20°, and extremes of temperature are rare. The highest temperature recorded in 1903 at Tallahassee, which is 253 feet above sea level, was 94° F., and the lowest 25° F. The county can not feel secure, however, from severe frosts, although these are very erratic in occurrence, and a period of several years sometimes elapses between them. The dates on which the first and last killing frosts of each season occurred are shown in the appended table of observations recorded in Tallahassee:

Dates of first and last killing frosts.

Year.	Tallahassee.		Year.	Tallahassee.	
	Last in spring.	First in fall.		Last in spring.	First in fall.
1896	Feb. 21	.....	1900	Feb. 25	None.
1897	Jan. 30	Dec. 28	1901	Mar. 17	Dec. 15
1898	Feb. 22	Nov. 27	1902	Feb. 18	Dec. 27
1899	Mar. 8	Nov. 4	Average	Feb. 24	Dec. 8

More than half of the annual precipitation falls during the growing season and the humidity is relatively high. Recently, however, lack of rain at critical times during the growing season has occasioned some injury to crops.

PHYSIOGRAPHY AND GEOLOGY.

The topographic features of Leon County are never abrupt or even roughly broken, but present a gently rolling or broad, wavy appearance, varied here and there by minor hills and valleys. The general trend of the surface features is from east to west, and in this relation to each other a series of broad physiographic divergencies is apparent. From some of the higher hilltops one may observe a general valley crossing the county laterally, including a width perhaps of several miles before another series of as high hills meets the eye. Such valleys, however, are so marked by lower hills, ridges, and more minor elevations that level areas of any considerable extent are rare. Again, the valleys are comparatively narrow, and with the adjoining series of hills, ridges, and spurs form a succession of well-marked depressions and elevations, which illustrate the effects of active stream work upon a plane formerly elevated about 200 feet above tide. The depressions are mostly flat-bottomed valleys, breaking up into numerous branches, which become gradually narrower until they form mere shallow ravines for some distance from their inception. The streams which occupy these valleys follow a winding course, in which the curves steadily lengthen as the valleys widen, and the current of the stream is correspondingly diminished. These hills are seldom more and usually

less than 100 feet above the valley bottoms. From Tallahassee north the general land level gradually ascends for a distance of several miles and then descends very slightly from a somewhat faint divide until near the Georgia line, toward which it again ascends. From Tallahassee south there is a gradual slope to the Gulf coast and the surface, marked only by long, low swells instead of by ridges and hills, presents a strong contrast to the configuration of the northern part of the county. The swells are usually broad-topped, with very gradual slopes, and although their mean elevation decreases slowly, it is nevertheless constant with the approach toward the Gulf. This general slope is almost always covered with dull yellow or white sand quite distinct from the bright-red color in the northern part of the county.

The succession of little hills and valleys, which give to the county as a whole a topographic aspect so varied and attractive, is caused by the mutual relations of the limestone which underlies the entire region and the superposed beds of clays, loams, and sands, of which the major part belong to the Lafayette formation.

Examples of the uneven dissolution of the underlying limestone are everywhere apparent. The St. Marks River, which is the principal stream in the southeastern part of the county, disappears underground and in a short distance surges again to the surface, thus forming the so-called Natural Bridge of that section. Similar examples of less importance are frequent. The numerous lakes, sinks, and connecting water courses of the county present many interesting local problems, inasmuch as most of them show clearly their direct relation to the underlying geologic structure. Owing to the light winter rainfall at the time of the survey, most of the sinks were dry, or nearly so, and the basal lime rock was either exposed or could be easily reached in numerous instances.

Three large lakes—Iamonia, Jackson, and Lafayette—are within the county, and a fourth, Miccosukee, lies along the northeast border. Subterranean passages, sometimes open, but usually closed or nearly so by débris, are a frequent concomitant of both these and the numerous smaller lakes. At times the water has entirely disappeared from Lakes Jackson and Iamonia, and then as the underground passage became closed they gradually filled again. During times of freshet the Ocklocknee River, which forms the entire western boundary of the county and receives the greater part of its drainage, overflows into Lake Iamonia through the "Upper Slough" until the water level of the lake equals that of the river As the river falls the lake returns its abnormal volume of water to the river through the "Lower Slough." Susceptibility to overflow causes a large area of meadow along the sloughs between the lake and the river.

After the deposition of the Lafayette materials of red and yellow sands and clays, which give rise to the most important soils, the region

was again depressed sufficiently to allow large areas in the southern part of the county to become submerged. This submergence also extended far up the stream courses to the northward until prevented by the closing in of the hills. From these waters were deposited the Columbia sands, which in the southern part of the county give rise to large areas of light sand. Farther north these sands, mingled with the finely comminuted material washed from the adjacent slopes, formed the sandy hammock land of the bottoms.

The forests of Leon County contain numerous species of trees and afford a large reserve of valuable timber. Extensive tracts of long-leaf pine, interspersed with smaller areas of blackjack oak, still occupy the greater part of the county south of Tallahassee. In the northern part of the county long-leaf pine, short-leaf pine, sweet gum, hickory, and several varieties of oak are common upland species, while the low-lands support a dense growth of black, yellow, and slash short-leaf pines, magnolia, bay, cypress, sour gum, sweet gum, water oak, beech, and willow, with scattering hickory, poplar, and tupelo gum.

SOILS.

The following table gives the names and areas of the several soil types established by this survey. A conspicuous feature of the types is the marked predominance of the sandy and sandy loam classes, there being only about one-half square mile of soil as heavy as loam or clay out of the 675 square miles land surface of the county.

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk sand	106,688	24.7	Leon fine sand	8,192	1.9
Orangeburg fine sandy loam	73,920	17.1	Orangeburg sand	6,912	1.7
Norfolk fine sandy loam	67,328	15.5	Gadsden sandy loam	5,952	1.3
Leon sand	61,376	14.2	Swamp	2,816	.7
Sandhill	42,752	9.8	Gadsden sand	2,112	.6
Norfolk fine sand	28,608	6.7	Total	431,872	.....
Meadow	25,216	5.8			

ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam consists of brown, reddish, or yellow medium to fine sandy loam, from 4 to 15 inches deep. In different localities, however, the soil ranges from a heavy brown to a gray sand. The subsoil consists of red sandy clay to a depth of at least 36 inches and usually much deeper, but underlying cross-bedded sands are sometimes exposed at depths of from 5 to 10 feet. Iron concretions are a frequent occurrence with this type, and small gravel is occasionally found.

Many of the hollows of the Orangeburg fine sandy loam, which are so numerous as to constitute a very important part of the type, present heterogeneous variations. The soil is perhaps most often a dark-brown fine sandy loam for at least 10 inches and usually from 12 to 15 inches. This is underlain to a depth of from 20 to 24 inches by a layer of medium to fine yellowish sand or very light sandy loam of similar color. This material gives way to a dark-brown clay loam, which generally extends to a depth of at least 36 inches, but near the bases of slopes it is often displaced at 30 inches or below by the typical red sandy clay of the adjoining upland. Another common variation is sandy loam from 6 to 8 inches deep, underlain to a depth of 3 feet or more by successive layers of sand and sandy loam which range in thickness from 3 to 8 inches. Both of these variations and several local departures from the true type, small in area but similar in physiographic position, are characteristic features of the Orangeburg fine sandy loam of Leon County, occasioned by the rolling surface features of the type in conjunction with the tendency of this soil to wash in degree varying with the steepness of the slopes, which are an almost constant feature of the type. These quasi-bottom lands are an important consideration when speaking of the Orangeburg fine sandy loam, as they are generally quite productive, are considered superior to the true type in crop value, and are often planted, especially by the negroes, to the exclusion of the adjoining upland soils. So popular have these numerous though small areas been that they are usually designated by the indefinite but supposedly very desirable term upland hammock.

The Orangeburg fine sandy loam is the most extensive soil type in the northern two-thirds of the county. It occurs in areas of irregular outline varying in size from a few acres to many square miles. The largest and most continuous area of this soil is typically developed north of Lake Lafayette, extending westward from the road between Chaires and Miccosukee to the Tallahassee and Miccosukee road. Another area of considerable importance is found along the shore of Lake Miccosukee, extending north to the Georgia-Florida line and thence westward.

In the vicinity of the Iamonia-Thomasville road, near the north boundary of the county and adjoining Thomas County, Ga., the surface soil contains considerable amounts of finer grades of sand than is typical. This feature is most noticeable where the type adjoins the Norfolk fine sand, but it sometimes occurs where none of that type is near, or at least of sufficient area to appear on the map. Among the farmers there is no recognized difference in crop value between this fine phase and the rest of the type.

In topography the surface is rolling and the slopes gentle, except along a few of the streams, where valleys of considerable depth have been eroded. Sinkholes are numerous, and they have added to the

irregularity of the landscape. There are no slopes, however, too steep to be cultivated. On account of the rolling character of the surface the natural drainage conditions are nearly perfect. The sandy character of the soil permits a large amount of water to be taken up during rains, and the subsoil is sufficiently impervious to prevent rapid leaching.

The Orangeburg fine sandy loam is derived from the sands and clays of the Lafayette deposition, which forms an almost continuous mantle over the northern part of Leon County.

The Orangeburg fine sandy loam, second of the soils in area, is the most important type in the area and the one most largely cultivated. It is generally recognized as the best upland cotton soil. The cotton is less subject to rust than on soils of the Norfolk series, and it grows later in the season. Under present methods of tillage the type is better adapted to cotton than to other crops, because the long tap root of the plant can penetrate the stiff subsoil better than the more fibrous roots of corn, cane, cereals, and potatoes, which, hindered in their downward course, are obliged to spread laterally along the surface of the stiff subsoil, and consequently shrivel at the approach of drought.

The Orangeburg fine sandy loam is considered poor for corn, because if plowed deep it "melts" and runs together after any heavy rain, then bakes hard, and the crop suffers. If thoroughly cultivated and kept open, it would produce good crops of any kind, but it is difficult to keep it in that condition, and so long as present methods of working obtain there is little possibility of efficient cultivation. With proper preparation and cultivation the Orangeburg fine sandy loam is probably one-fifth more productive than the Norfolk fine sandy loam, but as cotton, with its long tap root, is the only crop which can take advantage of this productivity under the prevailing methods, the Norfolk fine sandy loam, with its more plastic subsoil, is considered superior for all crops save cotton.

The Orangeburg fine sandy loam is naturally the best type of soil in the area for grain and forage crops, and by careful management in tillage, in the growing of legumes, and the judicious rotation of crops its productiveness could be largely increased. Filler tobacco has been grown satisfactorily in a limited way on this type, and it should prove a suitable soil for this purpose. It does not produce as good a quality of Sumatra wrappers, however, as soils of the Norfolk series.

The average yield of cotton without fertilizer on this type is about one-third bale per acre. Well farmed, an average of one-half bale is readily obtained, and intensive methods would make 1 bale per acre easily possible in favorable seasons. Corn yields from 8 to 15 bushels, depending largely on the way it is worked, and oats 10 to 20 bushels per acre. Little sirup is produced on this type, as it is inferior in both quality and quantity to that obtained from soils of the Norfolk series and the Gadsden sandy loam.

The subjoined table shows the average results of mechanical analyses of samples of both soil and subsoil of this type:

Mechanical analyses of Orangeburg fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12758, 12760	Soil	0.4	8.9	12.3	42.5	17.3	5.5	12.6
12759, 12761	Subsoil	.3	4.3	7.6	33.1	13.2	5.7	35.4

ORANGEBURG SAND.

The surface soil of the Orangeburg sand consists of medium to fine gray or reddish-brown sand which in places is sufficiently loamy to be classed as a light sandy loam. This material, which usually contains some iron concretions, ranges in depth from 6 to 10 inches, and is underlain by a reddish-yellow sandy subsoil which becomes somewhat sticky before giving way to the typical red sandy clay of the Orangeburg series. This change of subsoil takes place between 15 and 36 inches, but the average depth is about 2 feet.

The Orangeburg sand occurs only in a few small isolated areas, where it is associated with the Orangeburg fine sandy loam or the Norfolk sand, usually forming a transitional soil between those types. Occasionally a small area lies within the Orangeburg fine sandy loam, occupying a slight elevation which has not suffered from erosion, and again occurs on a long, gentle slope from the Orangeburg fine sandy loam to a stream course or its adjoining strip of meadow. On account of its topographic position and the depth of clay below the surface, the Orangeburg sand is well drained and also suffers more from drought than the Orangeburg fine sandy loam.

The Orangeburg sand is derived from the Lafayette formation, but in some cases the surface soil has been modified somewhat by surface washings from Norfolk sand or Orangeburg fine sandy loam.

This soil is not as well adapted to general farming purposes as the Orangeburg fine sandy loam, because the more porous nature of the soil and the greater distance of the clay below the surface renders it more susceptible to drought and less retentive of plant food. In the one instance in which wrapper-leaf tobacco has been grown under shade on this type the leaf was of excellent quality, and the yield without irrigation in a season abnormally dry was 700 pounds per acre.

Most of the type is used for general farming and is fairly well adapted to this purpose. Cotton yields from one-fourth to one-third bale per acre and corn from 8 to 12 bushels. The yields of all crops are usually a little below those of the Orangeburg fine sandy loam.

The following table shows the results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Orangeburg sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12754	Soil	0.4	9.2	17.5	52.3	11.7	2.9	6.2
12755	Subsoil	.3	7.9	16.7	43.2	8.5	2.9	20.4

NORFOLK SAND.

The surface soil of the Norfolk sand of Leon County consists of gray, yellow, or light-brown sand of coarse, medium, and fine grades, underlain to a depth of 36 inches or more by light-gray or yellow sand of similar texture. Near boundaries with heavier types this soil is sometimes underlain by clay loam or sandy clay at depths below 30 inches. The varied surface appearance of the type is due largely to the methods of cultivation which have obtained upon it. Where not tilled for a considerable period and where not burned over in recent years the soil has a dark loamy appearance, due to the accumulation of organic matter, but where farmed exhaustively or subjected to frequent burnings this characteristic is soon lost and the soil has a light-gray or whitish appearance. The marked difference in this soil which the presence of large amounts or organic matter produces is vividly shown by various fields in the county, which, having been benefited by heavy fertilization, appear in striking contrast to the surrounding type. In section 1, about 1½ miles southwest of Lake Jackson station, the sand is of coarser grades than usual and contains considerable fine gravel, thus rendering it less productive than the normal type.

The Norfolk sand is the most widely distributed soil in the area surveyed. In the western part of the county it occurs as a long trip of irregular width along the bluffs back from the Ocklocknee River, extending from Ward northeast nearly to the Georgia line. In the southern part of the county a band ranging in width from one-half mile to 4 miles extends from near Springhill eastward for 15 miles, gradually widens as it turns northward toward Chaires, and terminates but a short distance south of Miccosukee, in the northeastern part of the county. Numerous smaller areas are found in various parts of the county.

The type is generally level or but slightly rolling within itself, though it may occur as river bluffs, bottom lands, or large upland areas.

The principal part of the Norfolk sand is well drained. Only small areas have deficient drainage, due to their relation to streams or low,

swampy areas. The soil is so open and porous that it becomes droughty much sooner than the types with heavier subsoils.

In the northern part of the county this soil on the uplands is derived from the sands of the Lafayette mantle, while in some of the lowlands and in the southern part of the county it is derived from the Columbia sands.

The Norfolk sand is too light for the best results with general farming, but fair yields can be secured if well managed by following a regular crop rotation which includes one or more leguminous crops. For this purpose velvet beans have been the most successful, particularly in the southern part of the county.

On the few spots which are "cow-penned" sweet potatoes yield from 50 to 100 bushels the first year, sirup 10 to 20 barrels the second year, and corn 15 to 20 bushels the third year, after which time corn yields from 8 to 10 bushels per acre without fertilizer when rested in alternate years. Where the land is not "cow-penned" at all the yields are low, the land is generally rested every other year, and large areas are not farmed at all.

The little cotton grown yields from one-sixth to one-fourth bale per acre. Last year one farmer grew 1,415 pounds net of long-staple seed cotton which gave 446 pounds of lint from 2½ acres. As this is as large a yield as is obtained from short-staple cotton on the same field, and as the product brings a much higher price, the opportunity for extending the production of long-staple cotton on the Norfolk sand and Norfolk fine sand seems very favorable. The fact that about twice as much labor is required to pick the long-staple cotton, however, undoubtedly deters many from engaging in its production.

The following table shows the average results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Norfolk sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12730, 12732	Soil	0.8	8.1	9.7	49.5	21.2	6.4	3.7
12731, 12733	Subsoil	.6	9.1	10.2	47.5	23.0	5.6	3.6

NORFOLK FINE SANDY LOAM.

The surface soil of the Norfolk fine sandy loam in its typical development consists of a grayish or light-brown fine sandy loam, but in different localities it includes a range from light loamy sand to heavy sandy loam. This material, which has an average depth of 8 inches, gives way to a yellow sandy loam, which in turn is underlain at depths ranging from 12 to 30 inches by a yellow sandy clay

or clay loam. In the vicinity of Tallahassee and for 3 or 4 miles north of that city the subsoil of this type is frequently reddish yellow in color, and there represents a gradation between the Norfolk fine sandy loam and the Orangeburg fine sandy loam. In such cases the Norfolk fine sandy loam was mapped to include the variation. Along the north side of Lake Iamonia the surface soil of this type consists of finer grades of sand than is typical. The soil is often loamy, but in small areas it is very loose and consists of brown or yellowish fine sand. The subsoil is a plastic drab-colored clay loam. Small areas of similar surface soil occur north of Iamonia near the line with Thomas County, Ga. The most typical development of the Norfolk fine sandy loam occurs in an irregular and broken area which extends from east to west through Centerville and Bradfordville. In all of the northern two-thirds of the county, however, the type is of frequent occurrence and is second in importance only to the Orangeburg fine sandy loam, with which and the Norfolk sand it is usually associated.

The topographic features of the Norfolk fine sandy loam include many broad slopes, low hills, and intervening valleys incident to a gently or moderately rolling country. These physiographic fluctuations are seldom so strongly marked as with the Orangeburg fine sandy loam, and this characteristic gives to the type a much smoother general appearance.

Drainage is generally well established on this soil, but some of the upland areas are so flat that water collects in small pools, which become dry only at the approach of drought. The type undoubtedly retains a greater water supply available for general farm crops than any other soil in the area. This is largely because its clay subsoil is more plastic in its nature than the red clay and plant roots can penetrate it much more readily, thus gaining access to a larger supply of moisture.

The Norfolk fine sandy loam is derived in part from the Lafayette mantle, to some extent from later sedimentary deposits, and to a slight extent from a reworking of both these materials.

The soil is adapted to the production of corn, cotton, oats, rye, sweet potatoes, and forage crops. In Gadsden County this type is also considered a satisfactory soil for the production of wrapped tobacco [1] and would undoubtedly prove no less desirable here. Corn yields, if well cultivated, 15 bushels per acre without fertilizer, and if manured a yield of 25 bushels per acre may be obtained. So much of the type receives no fertilizer, however, and in addition is so poorly cultivated that from 10 to 12 bushels is an average yield. Cotton yields from one-fourth to one-third bale per acre. The sirup produced on this soil is superior in flavor and color and greater in quantity than that obtained from the Orangeburg fine sandy loam.

[1] Soil Survey of Gadsden County, Fla., Report of Field Operations, Bureau of Soils, U. S. Dept. Agr., 1903, p. 333.

The following table gives the average results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Norfolk fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12744, 12750	Soil	0.3	5.0	10.5	52.6	14.3	7.4	9.8
12745, 12751	Subsoil	.2	3.1	5.8	38.6	15.3	4.6	32.2

GADSDEN SANDY LOAM.

The surface soil of the Gadsden sandy loam consists of brown sandy loam from 8 to 14 inches deep, underlain by grayish-yellow or yellow sand or light sandy loam to a depth of 3 feet or more. The content of the coarse and fine grades of sand is such as to give the effect of a medium sandy loam, although the content of medium sand is relatively low. In small areas, however, coarse sand is present in sufficient quantities to constitute a coarse sandy loam. The surface soil is very similar to some of the Norfolk fine sandy loam, but the subsoil is dissimilar in that the underlying sandy clay of that type is entirely wanting or is found only in spots at a depth of nearly 3 feet below the surface.

The Gadsden sandy loam is found in small areas closely associated with the Norfolk fine sandy loam and the Norfolk sand.

The topographic features of the type are diversified. The upland areas are usually flat hilltops or small tablelands, but the type frequently occurs along streams elevated just above the meadow land, where such exists, or in shallow, well-drained depressions about small stream heads, and again it occupies gentle slopes between the upland and stream courses or the meadow adjoining them.

In a few small depressions or on gentle slopes along lake shores the soil, as well as subsoil, is of a rather heavier texture than is the case in the main areas of the type.

Drainage is generally well established, though in areas unimportant because of their small size, it is sometimes deficient near streams or meadow areas.

In elevated positions the type is derived from the sandy materials of the Lafayette formation, but on slopes and in lower lying areas it represents colluvial material, which in a few cases immediately along streams has been reworked with the Columbia sands.

Most of the Gadsden sandy loam is farmed, and it is markedly superior to the Norfolk sand in productivity and still is an easy soil to work.

Cotton and corn give good returns, and in the lowlands sugar cane brings a good yield of sirup of excellent quality. Where the physiographic position is suitable the type is well adapted to the growth of Sumatra wrappers under shade.

The following table shows the average results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Gadsden sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12770, 12772, 12776, 12778.....	Soil.....	0.9	13.1	14.1	40.9	11.4	5.6	13.8
12771, 12773, 12777, 12779.....	Subsoil.....	.7	12.1	15.1	42.1	10.7	4.8	14.3

NORFOLK FINE SAND.

The surface soil of the Norfolk fine sand consists of fine brown or dark-gray loamy sand from 6 to 14 inches deep. This material is loose and friable when dry, but packs slightly when wet. The subsoil consists of fine-grained pale-yellow or light-brown sand. An important area of the Norfolk fine sand is found in the northwestern part of the county between Lake Jackson and the Ocklocknee River, where a long and narrow area is separated from the overflow land along the river by a strip of Norfolk sand. In the southeastern part of the county the most typical development of the type is in the vicinity of Woodville. There the surface soil is the most loamy of any of the type in the southern part of the county, and this characteristic holds for a considerable distance toward the east. With increasing distance from Woodville, however, the content of organic matter steadily, though almost imperceptibly, diminishes until it is replaced on the east by the Leon fine sand, which is very deficient in organic material, and on the west, where the texture becomes coarser, by the Norfolk sand. Small areas are found along the shores of Lake Iamonia, and areas too small to be indicated on the map are not infrequent in the northern part of the county along lakes and also occupying the bases of slopes. Near the county line, north of Iamonia, the Norfolk fine sand is generally level, and occasional low, rolling hills and minor elevations constitute the only variation in its topographic features.

The natural drainage conditions of the type are such that it seldom suffers from too much moisture, yet it can withstand drought better than the Norfolk sand. Occasional small, low-lying areas, however, where adjacent to the Leon sand, small lakes, or sink holes, or in depressions along minor streams suffer somewhat from deficient drainage in wet seasons, and their crop value is correspondingly impaired.

The Norfolk fine sand is derived from the sedimentary deposits of the Gulf Coastal Plain.

In the northwestern part of the county and in the vicinity of Woodville the Norfolk fine sand is used to some extent for general farming, and cotton, corn, potatoes, and forage crops all bring good returns when well farmed. Most of the type in the southern part of the county, however, is still covered with the native forest growth, and little advance is being made toward extending its cultivation, though it is the best soil there, and should prove a fairly satisfactory soil for the general farm crops grown. Velvet beans seem to be the most successful leguminous crop which has been tried, and should be used as one member of a regular crop rotation. The soil is well adapted to early garden crops, but market limitations preclude at present the possibility of engaging profitably in this industry.

In the northwestern part of the county this soil without fertilizer brings an average yield of 10 bushels of corn per acre. Fertilized with stable manure cotton yields one-half bale per acre, and oats, following a leguminous crop without other fertilization, yields 15 bushels per acre.

The Norfolk fine sand, where the physiographic conditions are suitable, is exceptionally well adapted to the production of wrapper-leaf tobacco. In the area nea Lake Jackson, where the soil is typically developed, shade-grown leaf of excellent quality is produced. The leaf is fine in texture, thin and elastic, and burns well. For the extension of the wrapper-leaf industry this type undoubtedly presents remarkable opportunities.

The following table shows the average results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Norfolk fine sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12735, 12742	Soil	0.4	4.1	5.0	59.8	19.2	5.4	5.5
12737, 12743	Subsoil	.3	3.4	4.6	51.6	30.0	4.4	5.3

SANDHILL.

The surface soil of the Sandhill consists of coarse to medium loose yellow or white sand to an average depth of 6 inches. The subsoil consists of yellow sand which is generally similar to the soil in texture, but in places the proportion of coarse sand is greater and small amounts of fine gravel are present. The soil seldom contains an appreciable content of organic matter.

The principal Sandhill area begins a little more than 2 miles south of Tallahassee and extends east and west in a broad band until cut off on the east by Norfolk sand and on the west by the same type, which there, however, seems a gradation soil to the large area of Leon sand,

the chief type in the southwestern part of the county. Many smaller areas are associated with the Norfolk sand in the southern part of the county.

The topographic features of the type consist of low ridges, knolls, and swells, which give a somewhat rolling aspect to the principal area. The smaller areas are always hills or ridges surrounded by the Norfolk sand.

The Sandhill is derived from sands laid down as coastal deposits.

Both surface drainage and subdrainage are so excessive on account of the loose and porous character of the soil to a depth of many feet that it is not worth while to try to produce farm crops upon this type. Stunted pine and scrub oak are the natural forest growth. In spots the soil supports a sparse growth of wire grass, but over much of the area this appears only in tufts from 1 to 3 feet apart. The appearance of this type is dreary in the extreme, and it is practically worthless for agricultural purposes.

The following table shows the results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Sandhill.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per. ct.	*Per. ct.*	*Per. ct.*	*Per. ct.*	*Per. ct.*	*Per. ct.*	*Per. ct.*
12774	Soil	0.2	8.6	24.5	51.9	11.1	1.1	2.3
12775	Subsoil	Tr.	9.3	25.8	49.7	11.4	1.0	2.4

LEON SAND.

The surface soil of the Leon sand consists of from 6 to 10 inches of gray or white medium sand, occasionally containing sufficient organic matter to give to it a dark-gray color. The surface soil is usually moist and often very wet and inclines toward compactness. The subsoil is a pure white compact medium sand saturated with water, or nearly so, or sand of the same texture but colored light-brown, with similar water content.

The Leon sand occurs in one large area in the southwestern part of the county, its extreme dimensions being 9½ by 16 miles. There is also a small area between Ocklocknee and Lake Jackson.

The topographic features of the Leon sand are typical of the flatwoods country. In general the surface is very level, but it is marked in places by two sorts of elevations—long, low swells seldom exceeding a height of 3 feet above their surroundings, and small knolls, generally circular or elliptical in shape, but of similar height. The latter range in size from the fraction of an acre to 10 acres, but the average is less than 3 acres. Such areas are slightly more loamy than the true type, are similar to poor areas of the Norfolk sand, and would have been

mapped as that type had they been of sufficient extent. The entire soil type is marked by bay galls, many of which are but a few rods across, while others contain several acres. The frequency of these galls varies greatly, for in places several of them may be found in an acre, while again there are but 1 or 2 on a square mile. Precisely the same in character, but much larger in extent, are several swamps, of which the largest is Grand Bay.

The Leon sand is so level that the drainage is everywhere deficient, and water collects in the numerous bay galls. In a season of drought these galls are dry and the surrounding soil is no longer saturated, but at every heavy fall of rain the galls are filled, and if the rain is of long duration a series of them are connected by a stream which generally flows into the larger water courses emanating from the swamps. Drainage conditions so defective render the soil worthless for agricultural purposes.

The Leon sand is derived from the beds of sand drift which overlie the basal limestone, but they never have the bright red or yellow colors of the stratified drift north of Tallahassee, and in places these sands have been slightly reworked at the surface by shifting waters.

The Leon sand is not adapted to any farm crops under present agricultural conditions, and but for its timber growth would present a vast monotonous waste. It is covered, however, with extensive open forests of longleaf pine, which yield a considerable income even with the present inefficient and wasteful methods of gathering the pitch for turpentine distilling. The longleaf pine grows luxuriantly upon this soil, and the entire area should be devoted to its production. Under intelligent forestry management excellent opportunity is here presented for long-term investments. The soil can be bought at prices ranging from 75 cents to $2 per acre, but a forestry venture would require personal supervision to keep trespassers from cutting the timber or cupping it for turpentine.

The natural undergrowth in these open forests is wire grass and dwarf palmetto, and formerly large herds of cattle were maintained here on open range, but the advent and extension of the turpentine industry over nearly the whole district has so injured the grazing that many more cattle are lost now than several years ago and the number kept is rapidly decreasing.

The following table shows the results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Leon sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12766	Soil	0.8	18.3	16.5	37.5	19.7	5.2	1.5
12767	Subsoil	.8	15.0	16.2	37.8	21.3	5.6	3.1

LEON FINE SAND.

The Leon fine sand is a light-gray to white fine sand, usually underlain at 12 inches by a white fine sand extending to a depth of 36 inches.

The type is found in the southeastern part of the county, extending for several miles along both sides of St. Marks River. These areas vary from one-half to 2 miles in width. Two other smaller areas occur also in that part of the county.

The type is closely related to the Leon sand, the only essential difference being in the texture of the sand composing them. It has an almost level surface, and the natural drainage conditions are poor. It supports for the most part a growth of longleaf pine. Under present conditions the type is valuable only for its scattered timber growth and scant pasturage. Practically no farm crops are grown upon it.

The following table gives the average results of mechanical analyses of the Leon fine sand.

Mechanical analyses of Leon fine sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12768	Soil	Tr.	2.2	2.9	58.7	33.6	1.9	0.6
12769	Subsoil	.1	2.0	2.7	58.5	33.9	1.9	.7

GADSDEN SAND.

The surface soil of the Gadsden sand consists of black, brown, or dark-gray loamy fine sand, containing usually a large amount of organic matter. The subsoil is a gray, drab, white, or yellow fine sand, underlain usually at from 2 to 4 feet by a compact stratum of sand.

The type occupies small areas east of Lake Lafayette in the vicinity of Chaires and a few other scattering small areas. It also has a limited occurrence along the shores of Lake Jackson and near-by low-lying areas.

The soil occurs principally as level or slightly-depressed areas along the lake or stream courses, but is also found to a limited extent in isolated depressions which at some previous time have been swampy. To this former swampy condition is due the accumulation of organic matter. This condition is still exhibited in some places which are not yet completely drained by surfaces ditches.

The Gadsden sand is probably derived from the Columbia sands upon which organic matter has accumulated because of deficient drainage. In some of the areas the soil is composed principally of colluvial material.

Where drainage is sufficiently established, the type is moderately well adapted to the production of corn and forage crops. In some

areas cabbage and onions are successfully grown on this character of soil, and in others cotton and sugar cane would do well in favorable seasons.

The following table shows the average results of mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Gadsden sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
12728, 12762	Soil	0.7	7.8	7.7	48.0	19.4	9.2	6.9
12729, 12763	Subsoil	.8	7.0	8.3	48.6	22.4	6.1	6.5

SWAMP.

The term Swamp has been applied in this area to low-lying lands which are submerged for the greater part of the time. In the winter and after heavy rains at other seasons the water is waist deep over much of their area, and occasional holes are much deeper. In the summer these swamps often become dry enough so that one may travel about them readily, but after any extended rain this is impossible. The principal areas of this kind are associated with the Leon sand in the flatwoods country. The swamps are filled with a dense growth of bay, cypress, sour gum, and water-loving shrubs, and from the prevalence of the bay growth are called "bay swamps" or simply "bays." The most extensive occurrence of this kind lies southeast of Bloxham and is known as Grand Bay. Most of the streams in the southern part of the county have their source in these bays. At present such areas are of no value except for the timber which some of them contain, and as drainage would be generally impracticable or impossible it is not likely that any attempts of this kind will be made.

MEADOW.

Adjoining many of the streams of the county are low-lying, narrow, flat, poorly-drained areas of variable soil texture. As these areas are subject to overflow, they have been mapped as Meadow. Along the Ocklocknee River the fringe of overflowed land varies greatly in width. Steep bluffs sometimes extend along the river for a short distance, but they soon recede and are replaced by a low, narrow, flat area of Meadow, which increases in breadth until it is sometimes more than a mile wide. In the highest freshets this is all subject to overflow. The surface, although nearly flat, is cut by numerous bayous, small streams, and minor depressions or deep holes, all of which contain water most of the year. The soil is very diverse. It is most often, perhaps, a medium or fine sand or light sandy loam. This sand cov-

ering varies greatly in depth in short distances, but the average depth is about 12 inches. Frequently it is entirely absent and it seldom exceeds a depth of 15 inches, except in the northern part of the area, where in places it attains a depth of 3 feet.

When the sandy covering is lacking, the surface soil consists of extremely stiff, heavy clay, drab, light gray, nearly white, or light brown in color. The subsoil consists of a very heavy stiff clay similar in color to the soil. Where the sandy surface soil is present, it overlies the characteristic subsoil just described.

The low, nearly flat topography of the Ocklocknee Meadow, in conjunction with its extreme imperviousness to moisture, thereby preventing any downward drainage, its position along a river which leaves its banks at every extended rain, renders these areas unsafe and so impracticable for the purposes of cultivation that no attempt was made to classify them. The natural forest growth which covers them includes black, yellow, and slash shortleaf pines, bay, cypress, sour gum, sweet gum, water oak, beech willow, poplar, with scattering hickory and tupelo gum. This luxuriant growth affords a valuable timber supply which with conservative management will last for a good many years.

At each end of a small pond, located nearly a mile west of Tallahassee, occur two small areas of Meadow, one of which was artificially drained and sown to rice two years ago, but the yield was unsatisfactory. Here the soil, with an average depth of 12 inches, consists of black mucky loam or clay loam, grading into a gray sandy clay which is in turn underlain at 24 inches by a heavy plastic drab-colored clay. With drainage conditions well established both these areas would be adapted to the production of corn, cane, and all forage crops.

In the southern part of the county large numbers of hogs and some cattle are maintained in the Ocklocknee Meadows, but a different stock law in the northern part of the county requires the maintenance of fences, and so the pasturage is not of economic avail.

AGRICULTURAL METHODS.

Land in Leon County has been so abundant and cheap on account of the scarcity of white farmers that it has generally been found easy to get a living under the system of agricultural practice handed down by preceding generations. For this reason and from the fact that a large proportion of the land is worked under the tenant system by negroes, who are apt to consider only one year at a time and are usually unconcerned as to the condition of the land at the end of the season, there has been little incentive to steady improvement of farming methods. Progressive farmers are occasionally found, however, and they, by improving their methods of cultivation and paying more attention to the rotation of crops, may well be considered as pioneers

in a new and more intensive system of agriculture. Such men use two-horse plows, disk harrows, mowing machines, and other improved implements.

The sandy nature of most of the surface soil of Leon County renders it easy to plow and easy to cultivate throughout the growing season. A large part of the land is plowed with a one-horse plow to an average depth of 4 inches, and the furrow slices are so laid as to form a double furrow bed between the rows of the preceding season. Fertilizer is then dropped by hand through a fertilizer tube and covered with a little soil. The seed is then dropped either by hand or with a one-horse planter and covered with a scooter. Fortunately two-horse plows are now coming into use, especially in the northern part of the county. Where these are used, the land is plowed to a depth of 5 or 6 inches and the bedding is done afterwards with a single plow.

Corn, which is usually cultivated three times, is worked first with a single plow, then with a small sweep, and again with a plow which gives a little elevation to the bed. Any additional working is done with a sweep. Cotton is worked from three to six times, chopped once, and usually hoed twice. The high hilling, which is an almost universal practice in the area, leaves the crops much more susceptible to the effects of drought than would more level culture..

Tobacco is cultivated nearly every week until large enough to be liable to injury from the breaking of the leaves.

The climatic conditions of the county are not sufficiently tropical for sugar cane to mature its seed, and it is propagated by planting cuttings of the stalks.

The census of 1900 gives the percentage of farms operated by tenants as 81.4, and these farms are planted almost exclusively to cotton, with some corn and occasional patches of sugar cane and sweet potatoes. As the three latter crops are usually planted on particular locations, even the relatively small opportunity for crop rotation which these crops might be expected to furnish is lost, and cotton succeeds cotton year after year. The average colored farmer on a one-mule farm of 40 acres plants about 25 acres in cotton and 15 acres in corn. When a field becomes worn out by such a method of procedure, the tenant seeks to rent other land which he hopes is not so exhausted, while the landlord finds another tenant or the land is thrown temporarily out of cultivation.

Labor conditions are such, however, that in spite of the exhaustion of the land there is a gradually growing tendency for the white farmers to continue this policy and leave most of the cotton growing to negroes under the tenant system, while their own attention is devoted to other branches of farming. In this way only a very small percentage of the cotton land is fertilized at all, and when it is recalled that the land is also deprived of the benefits of crop rotation the wonder is not that the

average county yield is only one-fourth bale per acre, as given in the 1900 census, but rather that a sufficient crop is produced to afford sustenance to the growers.

Many of the white farmers, however, practice some form of crop rotation. In some cases land has become so unproductive by constant cropping with corn that the yield of that grain has been increased from 8 to 15 bushels per acre simply by resting one-third of the land each year. A common practice among the best farmers is to follow corn with oats and cowpeas the same season. After the peas are harvested, the field is pastured for the rest of that season and the next on the crab-grass, crow foot, and beggar weed which come in. If left another season, it becomes overrun again with broom sedge, which, in some unfortunate cases, is burned, thus destroying the humus which otherwise might accumulate. Corn may follow the fourth year or it may be preceded by cotton for one or two years, and small fields are sometimes planted to peanuts after the second year of pasturing. Sometimes only a part of the oats and cowpeas is cut for hay and the rest is pastured. The use of velvet beans is growing, and they are very successful here, but they are not popular because of the difficulty in saving the seed.

A common so-called rotation is cotton two or three years, followed by corn for the same number of seasons. Part of the area is then sown in oats and the rest in cowpeas, which are generally sown in the corn. A part of the peas are cut for hay and the rest left to improve the soil. Some land has been so exhausted that peas do not grow well. In such cases resort is sometimes had to the velvet bean, which will grow where peas fail.

Some of the best farmers apply commercial fertilizer to cotton at a rate of from 100 to 500 pounds per acre. An average price for this fertilizer is $22 per ton. Tobacco grown under shade is highly fertilized at the rate of 1½ tons of cottonseed meal or 100 bushels of cotton seed and 800 pounds of sulphate of potash per acre.

At least one dairyman has demonstrated conclusively the feasibility of adopting a definite system of crop rotation, which is entirely practicable and suited to the needs of dairymen in the county. From April until June some pasturage is afforded by the natural grasses. To supplement this for that period oats are mowed green. From June until October cowpeas are mowed and fed green. Variety is afforded during a part of this period by fodder corn, which is available from June until August. From October 1 velvet beans are used from two to four months. An underground silo furnishes corn ensilage from October until May 1 and variety is again given from December until April by pasturing fields of oats and rye mixed.

Hogs—a Poland China cross on razorbacks, which give a good general-purpose hog for this climate—are an important by-product

under this system. Pigs farrowed between January and March are pastured in the spring on oats and rye mixed, and in addition are fed plenty of skimmed milk, a little corn, and Japan cane which has been banked the preceding fall. This is followed by sorghum, green fodder corn, and peavines until October, when sweet potatoes are ready. These are followed with peanuts, which are usually replaced with corn from two to three weeks before killing to give firmness to the flesh.

A case such as just cited should afford sufficient incentive to surrounding farmers to adopt methods of farming whereby the fertility of their land may be not only maintained but largely increased. Many are not so situated or so trained that they could engage in the dairy business successfully, but there is no reason why everyone can not practice a suitable rotation on part of his land by growing at least enough leguminous crops each year to furnish the roughage needed for stock. Of crops suitable for this purpose beggarweed is perhaps the easiest grown, but the velvet bean grows vigorously in several parts of the county. The cowpea, which has been the most extensively grown, has failed in some places, and it is thought to be due to the lack of the bacteria which form the root tubercles. The experiment of introducing cultures of notrogen-fixing bacteria furnished by this department is being tried in the county this year and much hope in the results is entertained.

AGRICULTURAL CONDITIONS.

Leon County presents the general aspect of undeveloped possibilities. A climate remarkably open and mild and soils so susceptible to improvement that good crops can be easily and cheaply obtained, although the agricultural methods in general use are far out of date, furnish abundant opportunity for those who will properly develop their farming interests. The marked success of the enterprising few gives unmistakable proof of this.

The tenure of farms varies greatly in different parts of the county. From Bradfordville north probably 65 per cent of the owners live on and till their own farms. The rest of the cultivated land is leased to negroes in one and two mule farms (40 to 80 acres), the rental paid ranging from 400 to 700 pounds of lint cotton. On the excellent strip of soil which lies between Bradfordville and Tallahassee, extending nearly across the county from east to west, not over 15 per cent of the landowners live on and till their own farms. This land was formerly held in very large tracts, but much of it has now been divided into smaller holdings and is rented to negroes, while 80 per cent of the owners live in Tallahassee, Fla., and Thomasville, Ga., and about 5 per cent in northern cities. In the southern part of the county 95 per cent of the white people live on and till their own farms and 5 per cent is owned by negroes. The principal part of the land in the southern part

of the county, however, is not farmed at all, and large tracts, comprising from 1,000 to 10,000 acres or more, are owned by men engaged in the lumber or turpentine business.

The census of 1900 gives the average size of farms in Leon County as 85.4 acres, but they range from 40 to 1,100 acres or more (not including the larger bodies owned by nonresidents), and most of the white farmers own from 100 to 400 acres, with a probable average of 200 acres.

Notwithstanding the large negro population, from which most of the farm hands are drawn, it is very difficult to hire sufficient labor. There are several causes which contribute to this condition. Farmers have held that they could not afford to pay more than 50 cents per day for labor, though in some parts of the county the wage has now been raised to 75 cents per day. This is because the railroads, sawmills, and turpentine camps pay $1, $1.25, and in exceptional cases $1.50 per day for labor, and so control the situation. Turpentine cupping and gathering in the southern part of the county has been a popular occupation, inasmuch as the cupping is done at a stated rate per box, usually 1½ cents, and the laborer can take time off when he chooses. In the northern part of the county farm labor is more plentiful than elsewhere. There the price of day labor is 40 to 60 cents for men and 25 to 50 cents for women. Men who work by the month are paid from $8 to $10 and board, usually for a term of six to seven months, but occasionally by the year. Plowboys receive from $5 to $7 per month for six months, and after their time expires they pick cotton, "pull" fodder, etc., by the day. The most serious phase of the labor question is curtailment of cultivation for the reason that the farmers feel they can not afford to pay labor the price offered by other industries.

The character of the principal agricultural products varies widely in different parts of the county. In the central part of the area short-staple cotton is the crop of most importance, as the tenants grow barely enough potatoes and cane and not more than two-thirds enough corn for their own use, while a hog or two and a cow are the only live stock kept on the small tenant farms. In the southern part of the county the products are corn, sirup, oats, sweet potatoes, watermelons, and cantaloupes. Near the Ocklocknee River hogs and beef precede these products in importance and considerable honey is made.

In the northern part of the county cotton growing has been displaced to a considerable extent by general farming. Corn is the principal crop, and it is sold for cash, fed to beef cattle, and used for working stock in about equal parts. Grade Durham cattle are used for beef purposes, and Jerseys, with a few Guernseys, for butter. Butter is the leading product with a few farmers, and in that case pork is an important product. Two grades of oats are grown. If sown in November or December, the product weighs about 32 pounds

per bushel, while if sown in February or March from 24 to 28 pounds per bushel. About 60 per cent of the crop is sold in Florida markets, and the remainder is used at home. Of the large quantities of peanuts grown a few are sold in the local markets, but most of them are fed to hogs.

Much of the beef produced in the county is mediocre. The range cattle no longer thrive, but are small and poor. Cows too old to be profitable for milking also find their way to the local beef market. Some good beef is obtained, however, from young fattened steers.

Crab-grass and pea-vine hay are sold in sufficient quantities to supply the small local markets. Orchards of Le Conte pears are frequently seen, but most of them are infested with disease and generally neglected, as it is thought they can not be grown at a profit under present market and shipping conditions. Peaches and figs both thrive and many residents grow enough for their own use.

Sugar cane grows luxuriantly on many of the soils, and many farmers have some sirup to sell after supplying their own needs. The market for the sirup is so limited, however, that at present there is little encouragement to increase production. The excellent quality of sirup produced and the larger areas of soil suited to its growth should be sufficient incentive to establish the industry on a commercial scale.

The number of pecan trees in the county is given by the census of 1900 as 2,561. Many of these are scattered in dooryards, but there are a few small orchards. The trees are thrifty and productive for a term of years sufficiently long to give much promise for the development of this industry. The Orangeburg fine sandy loam, where the red sandy clay is at least 12 inches below the surface and not very stiff until a depth of at least 3 feet is reached, is probably the best soil type for this nut. Where the subsoil of the Orangeburg fine sandy loam is too stiff, well-drained Norfolk fine sandy loam is better for pecan growing.

Sea Island cotton, which has been successfully and profitably grown in a limited way on the deep sandy soils in the southern part of the county, gives promise for increased acreage.

The growing of Sumatra wrapper-leaf tobacco under shade is a success in Leon County, and there is enough land suited to its production to allow the industry to be largely extended. For the average farmer, however, there are several difficulties to contend with in growing this grade of leaf. The cost of erecting the shades and curing sheds is heavy, great care must be exercised in handling and curing the crop, small individual lots can not be assorted into the proper grades, and large areas require more capital than most farmers have. These conditions are sufficient to deter the average farmer from engaging in the business, but for the small grower the uncertainty of

disposing of his crop for a satisfactory price, because he must take whatever is offered to him by controlling buyers, is even more serious. If the market were open to the small growers, or if they could combine their crops in assorting and in sale, they might then, with large lots of a more uniform product, be able to dispose of their crop to better advantage. Of the success of the large growers who are sure of a satisfactory market, there can be little question, and the industry offers excellent opportunities for extension on a large scale.

Small areas of Sumatra tobacco grown in the open field yield about 1,000 pounds per acre, bringing an average price of 20 cents a pound. Cuban-filler leaf, grown in a small way, yields about 600 pounds per acre, and the average price is 15 cents per pound. An excellent quality of leaf is produced on the Orangeburg fine sandy loam, and this type, with the reddish-yellow areas of Norfolk fine sandy loam, probably offers the best opportunities for developing this industry.

The adaptation of soils to crops is recognized only in a very general way. The saying is common that the red clay of the Orangeburg soils is best for cotton, but that the yellow clay, by which is meant nearly all other upland types, is better for other crops. Bottom lands of all types are sought for corn and cane, but avoided for cotton, as the growth of stalk is too rank and it does not fruit well. Sea Island cotton is always grown on deep, sandy soils, as it is recognized that it does not do well on the clay subsoils. The Orangeburg fine sandy loam is avoided for cane, as it produces a darker-colored sirup than the Norfolk and associated soils.

Transportation facilities in the northern part of the county are very inadequate, as large areas are more than 10 miles from a station. The Seaboard Air Line Railway, connecting Jacksonville and Pensacola, crosses the county from east to west. The St. Marks branch of the same road, and the Carrabelle, Tallahassee, and Georgia Railroad connect Tallahassee with the Gulf; the Tallahassee and Southeastern goes to Gainesville and South Florida; and the Georgia, Florida, and Alabama Railway connects Tallahassee, via Bainbridge, Ga., with the North. The freight rates are said to be generally high and the roads not to afford the outlet for products that they should.

Tallahassee is the principal market for the central and southeastern parts of the county. In the northern part much of the cotton is sold at Metcalf or Cairo, Ga., sirup at Tallahassee, and tobacco at Quincy. The latter town is also the principal market for the southwestern part of the county. Cattle are often bought by drovers, who drive them to southern Florida markets or ship them from Tampa to Cuba.

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U.S. DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF

SOIL MAP

FLORIDA
LEON COUNTY SHEET

Soils surveyed by
Henry J. Wilder, J. A. Drake, Grove B. Jones
and W. J. Geib
1905.

Field Operations
Bureau of Soils
1905.